

## **Electrofishing and kick seining efforts for invasive signal crayfish (*Pacifastacus leniusculus*) on Kodiak Island, Alaska**

Kelly Krueger, Sun'aq Tribe of Kodiak

Signal crayfish (*Pacifastacus leniusculus*), which are not indigenous to Alaska, were first recorded in the Buskin River watershed on Kodiak Island in 2002. Since then, several organizations have noted the presence of signal crayfish within the watershed. In 2015, trapping efforts by Kodiak Soil and Water Conservation District found gravid female signal crayfish, indicating a breeding population. In 2016, the Bureau of Indian Affairs Invasive Species Program provided funding for Sun'aq Tribe of Kodiak to survey for signal crayfish within the watershed. To enhance the success of signal crayfish detection and removal from the watershed, this project utilized capture methods not previously used by others, including kick seining and electrofishing techniques. Trapping and kick seining for crayfish resulted in few specimens captured. However, electrofishing for crayfish proved more effective in numbers variety of age classes captured. Based on anecdotal information, the general public increased utilization of signal crayfish for consumptive uses in 2016. In particular, snorkeling/free diving has proved to be most successful. Survey results, partnerships and collaboration with the public will be discussed in this presentation.

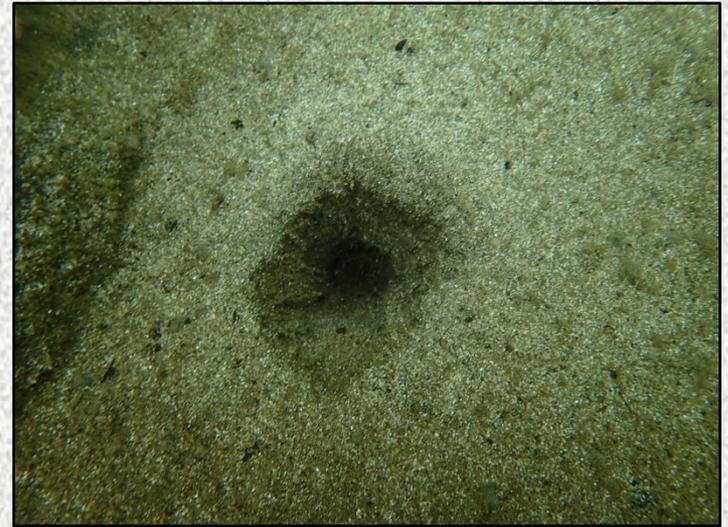
Electrofishing and Kick Seining Efforts  
for Invasive Signal Crayfish (*Pacifastacus  
leniusculus*) on Kodiak Island, Alaska



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Sun'aq Tribe of Kodiak

# Background

- Occur as a native species in the Pacific Northwest
- Prefer fresh and brackish water with temperatures below 25°C (77°F) and high dissolved oxygen
- Prefer rocky-bottomed areas that are also utilized by salmon and trout
- Can burrow extensively into stream banks and cause stream bank collapse, and reduced light penetration



Burrow in Buskin Lake, July 2016.

# Diet/Life History

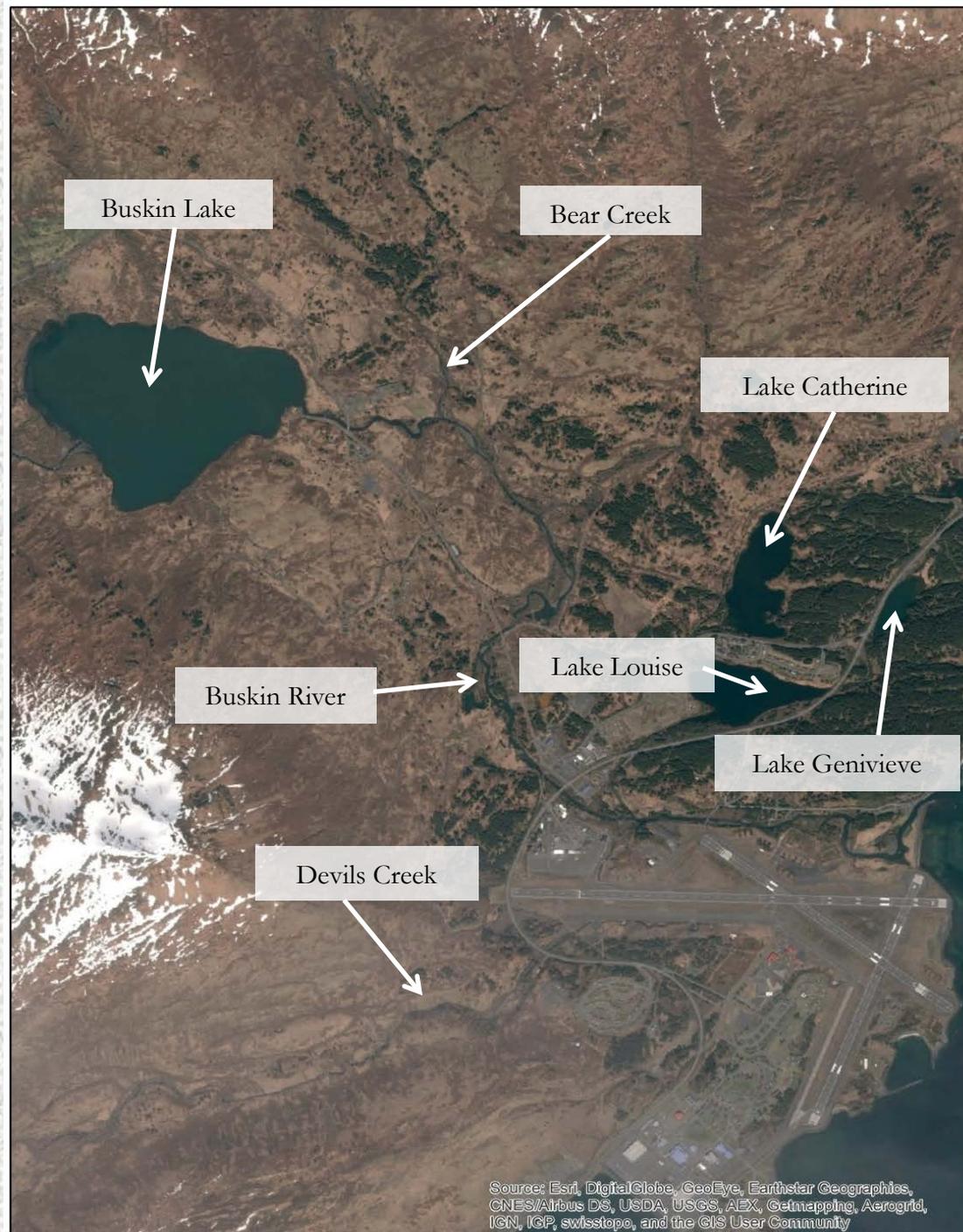
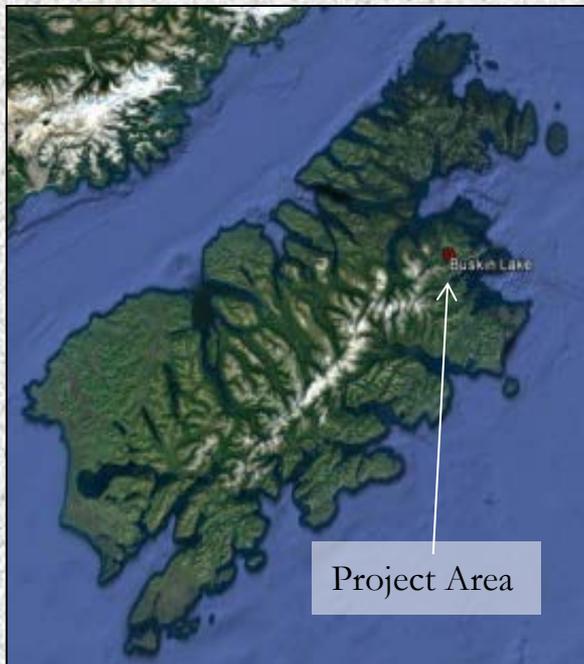
- Predatory species and consume algae, benthic insects, and woody debris
  - May also feed on fish eggs, fry and larger fish
- Mating and egg laying (normally 200-400) occurs in October
- Eggs hatch in following spring and stay attached to the mother for three moults
- May live as long as **20 years**



Young signal crayfish in Buskin Lake, August 2016.  
Photo credit Blythe Brown.

# Location

- Located 5 miles southwest of the city of Kodiak
- Approximately 11.2 miles of stream



# Signal Crayfish on Kodiak Island

- First noted presence in Buskin Watershed in 2002
- Alaska Department of Fish & Game set traps in 2012-2013, did not capture any crayfish
- Kodiak Soil and Water Conservation District trapped in 2014-2015
  - Confirmed breeding population with capture of a gravid female



# Tribal Concerns

- Buskin Watershed is one of the largest subsistence salmon fisheries in the Kodiak region
  - On average, 4,800 salmon are harvest for subsistence use each year
- Salmon fishing and consumption is an integral part of the Tribe's culture and lifestyle
- Signal crayfish have the potential to significantly harm the resources of Buskin Watershed

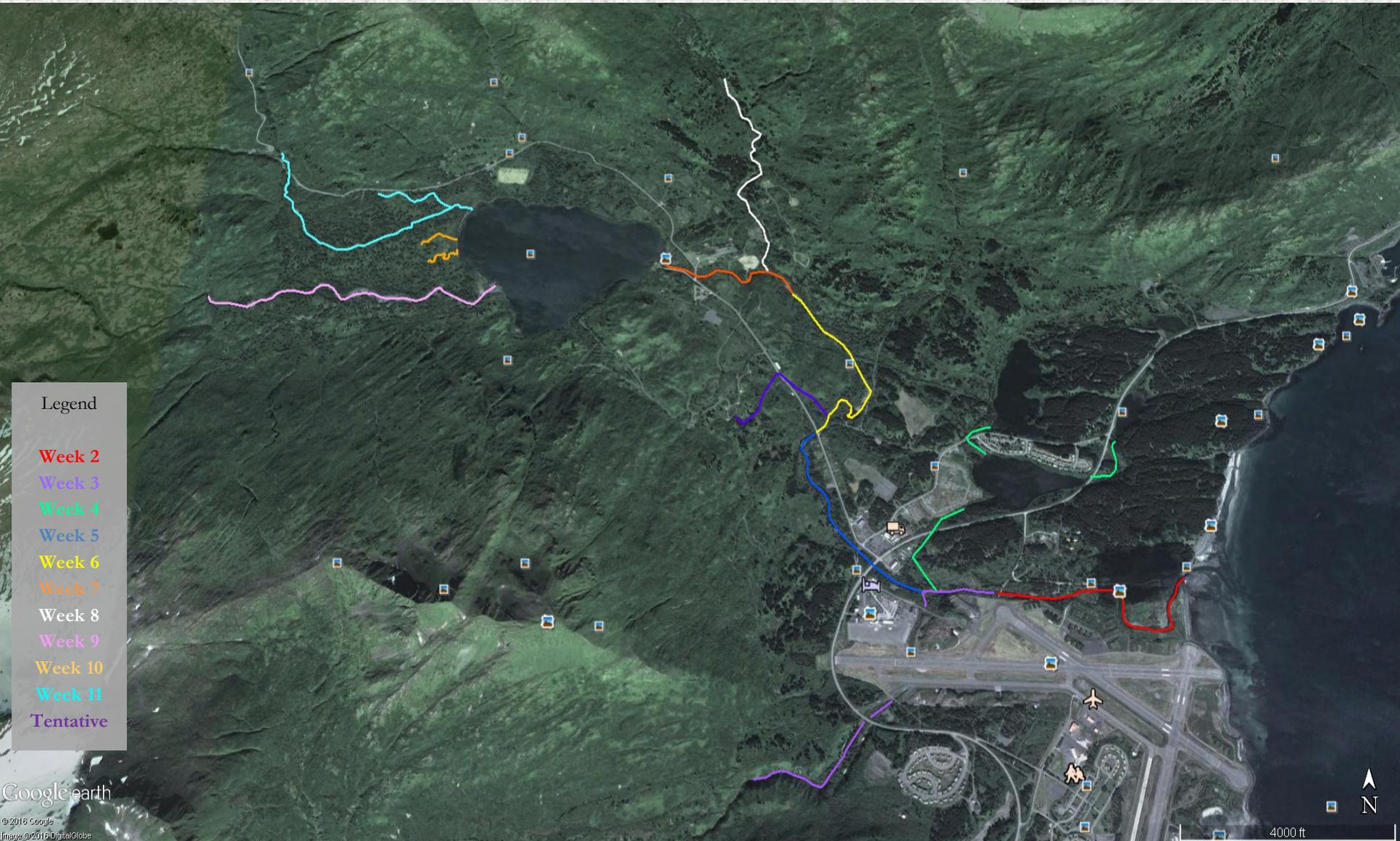


# Project Design

- Project goal: assess the effectiveness of electrofishing and kick seining for signal crayfish in Buskin River Watershed
- Crew surveyed a mile of stream per week by kick seining and flipping over rocks
- Any crayfish encountered would be sampled (species, total length and carapace length, sex, life stage, location) and removed from the watershed







Legend

- Week 2
- Week 3
- Week 4
- Week 5
- Week 6
- Week 7
- Week 8
- Week 9
- Week 10
- Week 11
- Tentative

Google earth

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Image © 2016 DigitalGlobe

4000 ft

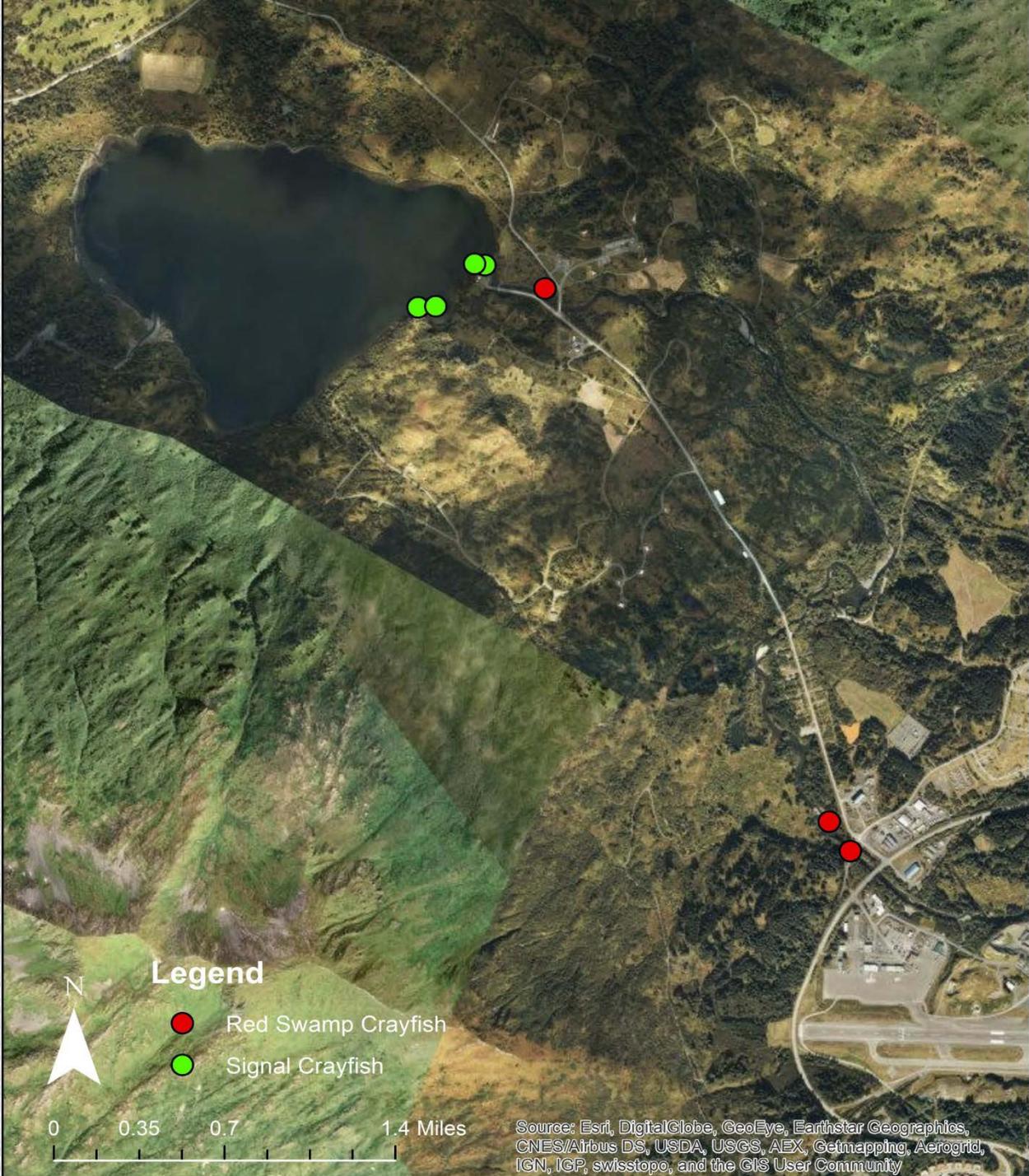


# Preliminary Results

Method	Number Captured	Duration
Kick Seine	0	10 weeks
Dip netting/hand capture	17*	10 weeks
Electrofishing	169	2 days
Snorkeling	195	Multiple occasions over 10 weeks
<b>Total captured:</b>	<b>381</b>	
Trapping (Kodiak Soil and Water Conservation District)	44	20 weeks
<b>Total captured in Kodiak:</b>	<b>425</b>	

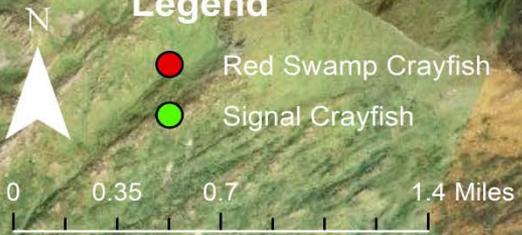
\*Includes 3 dead Red Swamp (*Procambarus clarkii*) captured in Buskin River on June 17, July 11 and July 12.





**Legend**

- Red Swamp Crayfish
- Signal Crayfish



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

# Size Classes & Sex Ratio

- Captured various size classes:
  - Mean total length: 79.7 mm (3.1 inches)
  - Largest specimen: 200 mm (7.8 inches)
  - Smallest specimen: 10 mm (0.4 inches)



- Sex ratio:
  - 1.2 (female) : 1 (male)
  - Female: 176
  - Male: 142
  - Unknown (juveniles): 63

# Public Outreach

- Posted signs at Buskin Lake outlet and all river access points
- Posted information and videos on website
- Education outreach at Coast Guard Base Kodiak welcome event
- Posted videos on social media to heighten public awareness
- Interviewed by Kodiak Daily Mirror and local radio stations about crayfish efforts

## INVASIVE CRAYFISH



- Crayfish are not native to Kodiak and could damage salmon habitat
- No crayfish (dead or alive) may be released into Kodiak waters

**Please contact us with any location information or sightings.  
We would like to record data from any crayfish captured.**

Kodiak Soil and Water Conservation District & Sun'aq Tribe of Kodiak

Blythe Brown (office): 907-486-5574

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Report Invasive Species: 1-877-INVASIV



# Hundreds of crayfish invading Buskin

By JULIE HERRMANN  
Mirror Writer

Crayfish, an invasive species, have been found occasionally in the Buskin watershed, and the Sun'aq Tribe is taking samples to figure out why it's spreading.

The problem is more widespread than previously thought. Since the early 2000s, the crustaceans have been spotted and reported occasionally.

Sun'aq Tribe has had little success with traps and kick seines, small nets, catching the species to sample, but local snorkelers and scuba divers have allowed Sun'aq to sample their catch.

So far, 228 crayfish have been sampled, including three of the red swamp variety.

"The red swamp was unusual, and we're not sure how they got in there," said Kelly Krueger, tribal biologist with Sun'aq. "All three were dead and almost looked like they were cooked, possibly a crayfish boil that was then dumped in the lake."

Red swamp crayfish are known to be very damaging to the areas they invade, so Sun'aq hopes that there are none alive or breeding in the watershed.

Signal crayfish have proven to be breeding in Buskin Lake. The Kodiak Soil and Water Conservation District, which works with invasive species, established that last summer.

"We've found females and also very, very small juveniles," Krueger said. "We actually found one female that had eggs already hatched, because the juveniles stay with the mom for weeks through three molting periods."

Signal crayfish can also damage the native habitat.

Krueger said the research team has observed burrowing in the banks of the lake, something the crayfish are known to do. In an area where burrows were seen in the bottom of the lake, there was no vegetation.

"We're not sure if (the lack of vegetation) is from the crayfish or there just usually isn't any vegetation there," Krueger said. "We're hoping (the burrowing) is not too extensive."

Ideally, all of the crayfish

would wind up gone from the Buskin system. The current program, funded by the Bureau of Indian Affairs, is for studying the crayfish. Sun'aq is in the process of seeking another grant to do more research next summer, including aging and stomach analysis to find out their diet.

"People are doing a great job catching them this year," Krueger said. "That is helping control the population, but

■ See **CRAYFISH**, Page 3



COURTESY SUN'AQ TRIBE OF KODIAK

A male signal crayfish caught and sampled earlier this month.

## Local Groups Examine Crayfish in the Buskin River

Posted by [Kayla Desroches](#)



Blythe Brown (right) and Kelly Krueger hold up crayfish they sampled from Buskin river. Kayla Desroches/KMXT

Kayla Desroches/KMXT

The Sun'aq Tribe of Kodiak and the Kodiak Soil and Water Conservation District have teamed up to determine just how much of a presence one invasive species has in the Buskin River.



Blythe Brown, project coordinator with the Conservation District, says her organization has been getting reports of crayfish in the Buskin River since the early 2000s and received funding from the U.S. Fish and Wildlife Service last year to investigate.

"We found males, we found females, females with eggs, and crawfish of all sizes, so obviously they were breeding, so this year Sun'aq received a grant to continue the Soil and Water Conservation District work and to expand on it, to try different trapping method and different locations."

According to a Sun'aq Tribe press release, the Bureau of Indian Affairs Invasive Species Program granted the project funding in May, and researchers have been sampling and surveying one mile of river per week.

Brown says while they found a few carcasses of red swamp crayfish, which may have been ordered as food, the majority of crayfish they finding are signal crayfish.

"They're native to the Pacific Northwest, and that's one of the reasons why Fish and Wildlife Service and the Soil and Water Conservation District and Sun'aq – why we are so alarmed because they will survive quite well here, because they survive in the Pacific Northwest where their weather and habitat is similar."

As far as how the crayfish got to the island, she speculates that people may have ordered them online for school projects, pets, or bait.

# Future Work

- Applied for funds from USFWS Tribal Wildlife Grant
- Proposal focuses on:
  - Diet
    - Will conduct stable isotope analyses on 100 signal crayfish
  - Movement
    - Will tag 15 signal crayfish in mid-summer and early fall to plot the seasonal habitat use
  - Distribution
    - Will utilize a snorkeling and scuba diving crew to delineate spatial distribution over time
- If funded, project will begin in March 2017



Signal crayfish with PIT tag<sup>1</sup>

<sup>1</sup><http://www.mattjohnson.org.uk/research/crayfish-field>

# Acknowledgements



Special thanks to:

Dave Kaplan

Annie Looman

Tonya Lee

Blythe Brown

Laurel Hannah

Melinna Faw

Will Frost

Brett Kutyna

Kodi Garcia

Carlie Lee

Quinth Family

Brian Cleary

Pearson Brodie

Funded provided by the Bureau of Indian Affairs Invasive Species Program